White Paper
Grant Number HD-228783-15

"MuSO: Aggregation and Peer Review in Music"

Timothy Duguid, Project Director
Texas A&M University
August 31, 2016

Narrative Description

"MuSO: Aggregation and Peer Review in Music" was a project that laid the foundation for a virtual research environment (VRE) dedicated to music. It explored ways in which such an environment could draw from and contribute to existing VREs in the fields of history and literature. The MuSO (Music Scholarship Online) project considered the descriptive metadata needed for digital projects in music to become interoperable with these existing resources and proposed a peer reviewing mechanism that would provide quality control for the projects that would be aggregated by the MuSO VRE.

Project Activities

At the end of September, the Project Director and Principal Investigator, Timothy Duguid, attended the Project Directors' Meeting at the NEH Headquarters in Washington D.C. By this time preparations had already begun in organizing the primary output of the project: a meeting to discuss issues surrounding aggregation and peer review of digital projects in music.

Immediately following the awarding of the grant, the College of Liberal Arts published a story on the project (along with another NEH project) that was placed on the school's website and sent to Texas A&M Former Students (see Appendix A). To promote the meeting and the activities of the project, a website was built, at http://muso.tamu.edu. In addition, the Project Director utilized Twitter and Facebook to promote the activities of the MuSO project, including the meeting and the conference presentations that followed.

The meeting gathered a group of leading music librarians, musicologists, and music encoders to discuss these issues at Texas A&M University on January 27 and 28. Discussions occurred both through an email discussion list and at the meeting, the latter of which was attended by the following individuals:

Maristella Feustle, University of North Texas
Richard Freedman, Haverford College
Giuseppe Gerbino, Columbia University
Francesca Giannetti, Rutgers University
Johannes Kepper, Detmold/Paderborn
Mark McKnight, University of North Texas
Laurent Pugin, *Répertoire International des Sources Musicales*
Perry Roland, University of Virginia
Craig Sapp, Stanford University
Carl Stahmer, University of California at Davis
Joanna Swafford, State University of New York, New Paltz
Raffaele Viglianti, University of Maryland

The following participants were unable to attend the meeting, but they participated in the email discussions:

Mauro Calcagno, University of Pennsylvania
Tim Crawford, Goldsmiths College, University of London
Ichiro Fujinaga, McGill University
Robin Leaver, Yale University
Jesse Rodin, Stanford University
Sherry Vellucci, University of New Hampshire

Those unable to attend the meeting were also able to participate remotely using the BlueJeans meeting service to which Texas A&M has an ongoing subscription.

The meeting was divided into two parts: day one dealt with issues surrounding the minimum metadata that should be required of digital projects in music, and day two focused on issues of peer review for digital projects (see Appendix B). The meeting incorporated several paper presentations, focused small group discussions, and large group discussions. Participants were invited to make notes on a shared Google Doc, and those notes were used to compile the final meeting notes (see Appendix C).

In the weeks and months following the meeting in January and before the ARC spring meeting, discussions continued via the email discussion list. In the course of those discussions, we were able to confirm a set of six recommendations to the ARC community that would promote the aggregation of musical resources and content along with its existing historical and literary collections (see Appendix D).

The Project Director attended the spring ARC meeting held at Purdue University on May 5-7. At that meeting, he presented a proposal for MuSO to join the ARC community. MuSO was officially admitted to the community, and Director participated in the metadata discussions that followed, presenting MuSO's recommendations for modifications to ARC's metadata standards.

Due to the activities of MuSO, the Project Director was invited to participate in a question-and-answer panel at the Music Library Association in Cincinnati entitled "Bridging Emerging and Established Approaches to Music Research" during which he discussed the MuSO project and the need for a virtual research environment for music that draws together new and existing digital resources for music along with those being created by scholars in other humanistic fields.

To promote the findings of the MuSO meeting among musicologists and music encoders, the Project Director gave paper and poster presentations at relevant conferences. First, he presented a paper at the American Musical Society Southwest spring meeting in San Antonio, TX (see Appendix E). He also presented a poster at the Music Encoding Conference in Montreal. The poster was entitled "Music Scholarship Online: Aggregation and Peer Review for Music" (see Appendix F), and it garnered much interest from the encoding community as it seeks to ensure high-quality digital scholarship is accessible and discoverable to music performers and scholars alike.

Accomplishments

This project set out to accomplish two things: to establish a metadata framework for digital objects relating to music and to outline a method for peer reviewing digital content relating to music. The first objective was accomplished through the RDF recommendations that MuSO made to the ARC community. With these set, MuSO has a basic RDF schema on which to start aggregating objects that will make them interoperable with digital objects relating to other disciplines already aggregated by ARC.

The second objective was accomplished by outlining a bi-level peer review process. The MuSO community decided that the first level of peer review would be most appropriate for digital collections. At this level, the MuSO Advisory Board would determine the suitability of the content by asking each project the following questions:

1. To whom is this content interesting?
2. How does the project make its materials manifest, exposed, and documented?
3. What is the sustainability plan for the project?
4. Does the project achieve its own goals?

Should a project require a more rigorous academic review, the MuSO Peer Review Board would assign it to a discipline-specific reviewer who would consider the resource's content and a technology reviewer who would ensure the material is stored and presented in ways that adhere to current standards.

Audiences

There were three major audiences for this project: music librarians, traditional and digital musicologists, and digital humanists. Participants in the MuSO meetings and email discussions were taken from these three groups, and specific actions were taken to reach out to each during and after the meeting in January.

The first major audience, music librarians, form perhaps one of the most important groups for the MuSO project, particularly in its early stages due to their expertise in descriptive metadata and the myriad of recent and ongoing digitization projects that could be aggregated into MuSO. As such, the project director has attended consecutive annual meetings of the Music Library Association. This has been invaluable as he has been able to raise awareness for the MuSO project. At the last meeting in Cincinnati this past March, the project director participated on a panel during which he outlined the MuSO project for an audience of 150 music librarians.

The second major audience, digital musicologists, is a significantly smaller group than music librarians. However, it is no less important. This second group will generate the born-digital projects that MuSO will review and aggregate. The project director gave a paper presentation at the April meeting of the Southwest American Musicological Association in San Antonio, which was attended by 50 musicologists from Texas and American Southwest. The paper was very well received and has sparked new collaborations with musicologists in the Southwest United States, as many of them are engaging in born-digital research projects and music digitization projects. In addition, the project director presented a poster in May at the Music Encoding Conference in Montreal.

The poster garnered significant interest from the conference's 80 digital musicologists and students in attendance from around the world.

The final major audience, digital humanists, was also reached in a couple of significant ways. First, the MuSO project teamed up with the Digital Humanities Working Group at Texas A&M to present a public lunchtime presentation by MuSO participant Carl Stahmer on the final day of the MuSO meeting. The presentation, entitled "The Early Modern Ideology: the economics and politics of moveable and virtual type" built on the MuSO discussions by exploring the new developments in the English Short Title Catalogue, particularly as it builds and implements a linked data infrastructure for its database. The presentation was attended by 50 digital humanities scholars from Texas A&M. The project director has also had a snapshot presentation accepted at the upcoming Digital Library Federation Forum meeting in Milwaukee in November, which will serve to expand awareness of the MuSO project, particularly as it looks ahead towards implementation.

Continuation of the Project

With the RDF established and a peer reviewing process outlined, MuSO is ready to be implemented as a full-fledged Virtual Research Environment and member of the Advanced Research Consortium. The project director has taken a new position at Glasgow University starting in October of this year, and Glasgow is very interested in the development and implementation of MuSO and will support the director as he seeks implementation funding for the project from within the United Kingdom. In particular, the Mellon Foundation has historically funded projects similar to MuSO, and the Leverhulme Foundation and Arts and Humanities Research Council are other potential benefactors for an implementation project.

Thanks to the outreach efforts of the project, a number of partnerships have been strengthened that will be critical in the future implementation of MuSO. The Advanced Research Consortium has been a key partner in the MuSO project, and this relationship promises to continue into the implementation, particularly as MuSO has officially become an official member of the ARC community. In addition, the MuSO project has resulted in strengthened collaborations with the Music Encoding Initiative (MEI) out of the University of Virginia, and MuSO will look to establish MEI as the standard for encoding RDF-compliant metadata for participating projects. It will also continue to work with the Single Interface for Music Score Searching and Analysis (SIMSSA) project out of McGill University to develop a method of sharing data so that both can benefit from the content available through their aggregated digital resources.

A number of new partnerships have also been formed as a result of the outreach efforts of the MuSO project. Notably, MuSO will collaborate with *Digital Humanities Quarterly* and *DHCommons* to publish MuSO peer reviews. MuSO will also pursue formal partnerships with *Répertoire International des Sources Musicales* as well as the Opera and Ballet Primary Sources project out of Brigham Young University to help identify and provide content for aggregation into MuSO and in fine-tuning the RDF for MuSO.

Long Term Impact

Thanks to the recommendations of the MuSO community, a number of changes have been made to the ARC RDF standards that will allow it to aggregate and describe musical content in ways that will be meaningful to music scholars. This will broaden the scope and impact of ARC as it seeks to make digital scholarly content discoverable and accessible to students and researchers around the world.

Grant Products

The grant resulted in a number of products. First, Elizabeth Grumbach and Laura Mandell gave presentations on aggregation and digital peer review at the MuSO meeting in January, and the PowerPoint slides from these presentations are freely available through Texas A&M's digital repository, the OakTrust at https://oaktrust.library.tamu.edu/handle/1969.1/157173. In addition, the official notes from the meeting are stored and freely available from the OakTrust.

The project director's panel presentation in "Bridging Emerging and Established Approaches to Music Research" from the Music Library Association meeting may be viewed through the MLA's conference video archives at http://www.musiclibraryassoc.org/mpage/mla_2016_media. The poster presented at the Music Encoding Conference is reproduced in Appendix F. Finally, the presentation that the project director made at the American Musicological Society is available in Appendix E and is being revised for submission to *Notes,* the Journal of the Music Library Association.

The MuSO website, available at http://muso.tamu.edu, provides another set of links to many of these resources. It is hosted by the Initiative for Digital Humanities, Media, and Culture (IDHMC), where it will continue to reside for the next two years, until funding can be secured to implement MuSO, or until another host can be found.

Appendix A: Local Publicity

Major grants to preserve the arts

July 13, 2015 (taken from https://liberalarts.tamu.edu/blog/2015/07/13/major-grants-to-preserve-the-arts/)

By Tyler Webb
With two new grants from the National Endowment for the Humanities (NEH), one of the largest funders of humanities programs in the United States, the College of Liberal Arts at Texas A&M University will be able preserve historical culture and musical arts.

Daniel Schwartz, an assistant professor in the Department of History and grant recipient, is on the second round of funding of a $300,000 grant project, "Advanced Reference Resources for Middle Eastern History."

The main focus of the project, which is co-authored by David Michelson of Vanderbilt and Jeanne-Nicole Mellon Saint-Laurent of Marquette, is the website Syriaca.org, which publishes online reference works regarding the culture, literature and history of Syriac communities during the late antiquity period to present. Syriac, a dialect of Aramaic that is still used liturgically in Christian churches throughout the Middle East, is a large part of their heritage and culture.

"The basic mission of this website is to create a cyber-infrastructure, which is basically a set of online tools for doing research but also for linking research projects," Schwartz said. "So we collaborate with a handful of projects in the states working with manuscripts and texts."

The prevalence of Syriac culture sprouted during the period commonly known as the Dark Age, or Late Antiquity, which refers to the moment when the Roman Imperial power in the western half of the Mediterranean fell apart and the development of barbaric kingdoms became prevalent.

While previously overlooked, scholars have recently shown interest in this period because this is when cultures outside of the Roman core began to produce their own languages and literature.

"They are considered barbarians by the Romans," Schwartz said. "They're outside the civilized world. It's a great moment when we get the periphery talking back to the core."

One of the key things being done through Syriaca.org is the creation of Unique Resource Identifiers, or URIs, that allow researchers to link their information together into one common system.

“My specific area of focus is working with people,” Schwartz said. “There are many different names that people use to refer to me, and as a human you understand that, but a computer has no way to comprehend that unless we tell it that. These URI’s create the opportunity to link between a variety of things. We’re creating these unique identifiers for people, texts, and manuscripts.”

With this next round of funding, Schwartz’s team is working on a handbook of Syriac texts, cataloging all the authors, sources and works, and putting all of them into one place.

The second NEH grant is for a project entitled “Aggregation and Peer Review in Music.” It is a $30,000 start-up fund with similar principles of preservation.
Led by Timothy Duguid, a postdoctoral research associate in the Initiative for Digital Humanities, Media and Culture, the project aims to create MuSO, or Music Scholarship Online. This will serve as a library of musical projects available on the internet.

Ranging anywhere from Beethoven to Lady Gaga, Duguid says this site is for the preservation of all music styles.

“It’s sort of like a one-stop shop for finding things online,” Duguid said. “It fills a need right now in the music community. Music researchers are starting to produce resources online but don’t have a way to promote them. There’s single place where I, as a scholar, can go to find it. This will make it so that even if you don’t know it exists, you will still be able to find it.”

In addition to a significant publicity campaign for MuSO, the funding from the grant will be largely used to host a two-day workshop of 15 scholars at Texas A&M to discuss the project.

“We will be discussing two areas of focus,” Duguid said. “First is regarding aggregation: What data do we need to collect from projects in order to make this valuable to music scholars. The second is providing peer review for projects that we decide to ingest. We want to make sure that the resources we are gathering are high quality.”

The funding for the project began in June, so the workshop is expected to be held within the next year.

Appendix B: Meeting Schedule

Thursday, January 28

9:00-9:30 – **Welcome & Introductions [MSC 2505]** (Timothy Duguid)

9:30-10:30 – **Breakouts & Discussion [MSC 2505]:** What do music scholars need from a digital curator and search mechanism?

10:30-11:00 – Break

11:00-12:30 – **Presentation [MSC 2505]**: "A template for MuSO: The Advanced Research Consortium and its RDF Guidelines" (Laura Mandell & Elizabeth Grumbach)

12:30-13:30 – Lunch

13:30-14:30 – **Breakout session [MSC 2505]**: What can current music projects tell us about essential metadata for music scholars?

14:30-15:00 – Break

15:00-17:00 – **Discussion [MSC 2505]**: What RDF guidelines should be used by MuSO?

Friday, January 29

9:00-10:00 – **Presentation [MSC 2505]:** "Digital Peer Review within ARC" (Laura Mandell & Liz Grumbach)

10:00-10:30 – Break

10:30-11:30 – **Breakout Discussions [MSC 2505]:** What standards should be used to evaluate digital projects in music? What are some exemplars for digital projects in music?

11:30-13:30 – **Lunch and Public Presentation [Glasscock Center]:** "The Early Modern Ideology: the economics and politics of moveable and virtual type" (Carl Stahmer)

13:30-15:00 – **Discussion [LAAH 433]:** What should be the peer review process for digital projects in music?

15:00-15:30 – Break

15:30-17:00 – **Discussion [LAAH 433]:** Future plans and next steps

Appendix C: Meeting Notes

1. Breakout Session 1 – "What do music scholars need from a digital curator and search mechanism?"

Participants were asked to list some music aggregators and then to identify the critical characteristics of a music scholarship aggregator.

The group identified the following aggregators:

- ArchiveGrid (www.oclc.org/research/themes/research-collections/archivegrid.html)
- Digital Resources for Musicology (drm.ccarh.org)
- DoReMus (www.doremus.org)
- Europeana Sounds (www.europeanasounds.eu)
- Isidore (www.rechercheisidore.fr)
- Music Treasures Consortium (memory.loc.gov/diglib/ihas/html/treasures/treasures-home.html)
- Opera and Ballet Primary Sources (sites.lib.byu.edu/obps)
- Portal to Texas History (texashistory.unt.edu/)
- NINES (www.nines.org)

It was discussed that good aggregators should:

- Include short descriptions of the projects as a whole
- The descriptions should be uniform and use metadata
- They should be flexible to allow for some variability based on individual project needs
- Allow user submissions
- Allow easy searching
- Offer outreach and training for metadata standards
- Acquire a constant funding source

2. Breakout Session 2 – "What can current digital projects tell us about essential metadata for music scholars?"

Participants were asked to list some digital projects in music and to take a look at their descriptive metadata. They were then asked to compare this with ARC's RDF.

The list of digital projects included:

- Augmented Notes (www.augmentednotes.com)
- Beethoven's Werkstatt (beethovens-werkstatt.de)
- Centre for the History and Analysis of Recorded Music (www.charm.rhul.ac.uk/sound/sound.html)
- Chopin First Editions Online (www.chopinonline.ac.uk/cfeo)
- Documenting Teresa Carreño (documentingcarreno.org)

- English Broadside Ballad Archive (ebba.english.ucsb.edu)
- Enhancing Music Notation Addressability (mith.umd.edu/research/enhancing-music-notation-addressability/)
- Freischütz Digital (www.freischuetz-digital.de)
- John Cage Unbound (exhibitions.nypl.org/johncage)
- Linked Jazz (linkedjazz.org)
- Lost Voices: The Chansons of Nicolas du Chemin (digitalduchemin.org)
- Marenzio Online Digital Edition (www.marenzio.org)
- Networked Environment for Musical Analysis (cirss.lis.illinois.edu/Project/project-details.php?id=20)
- New York Philharmonic Digital Archives (archives.nyphil.org)
- Online Chopin Variorum Edition (www.chopinonline.ac.uk/ocve)
- Schenker Documents Online (www.schenkerdocumentsonline.org)
- Songs of the Victorians (www.songsofthevictorians.com)
- Structural Analysis of Large Amounts of Music Information [SALAMI] (cirss.lis.illinois.edu/Project/project-details.php?id=14)
- Virginia Woolf Online (www.woolfonline.com)

Projects identified generally used the following metadata categories:

- Creator
- Title
- Unique Identifier (URI)
- Scope and content statement
- Repository
- Form/Genre
- Notation types
- Tools/Capabilities
- Typology
- Technical specs for recordings, etc.
- Authorities

It was suggested that the MEI header could be a vehicle for metadata content.

One suggested modification to the ARC RDF was to change <role…> to something like <Persname role =”XXX” xml: id = “Jane Doe”>. This would make the data more interoperable and compatible with linked data systems.

It was determined that some of the ARC RDF is not consistent and that the categorizations need to be brought to the same level. That is, apples and oranges should not be possibilities in the same metadata field.

For the <dc:type> field, the following should be added:

- Dataset
- Printed text

- Realia
- Notated music
- Encoded content

We also recommend that "full text" should be modified to "searchable content" or something to that effect to allow for searching of encoded media.

3. Breakout Session 3 – "What standards should be used to evaluate digital projects in music?"

Objects that can be reviewed:
- Encoded content
- Software tools
- Archives
- Digital editions

Things to consider in a review:
- Motivation of the project (audience, perceived use, goals)
- Documentation of the project
- Integrity of practices, research questions
- Clear and orderly site architecture
- Visibility and Accessibility (Usability)
- Sustainability (a plan must be in place, regardless of whether it is to last or become obsolete)
- Description of the intellectual property and materials that the site offers
- Accreditation of sources and contributors
- Importance and Relevance
- Innovation and Originality (either in presentation or content)
- Interoperability

We determined that MuSO should have two levels of peer review:
1. Aggregation Review – This is a basic review by the editorial board to determine whether a project merits inclusion in the MuSO catalog
2. Traditional Review – This is an academic review of the content and presentation of the resource

We recommend that ARC change its basic peer review questions to:
5. To whom is this content interesting?
6. How does the project make its materials manifest, exposed, and documented?
7. What is the sustainability plan for the project?
8. Does the project achieve its own goals?

Next Steps

It was agreed that MuSO should join the ARC community. A sub-node structure for MuSO could be envisaged that would parallel the current ARC structure. However, MuSO should start as a single node that could then subdivide as things develop in the future.

The initial governance structure of MuSO would consist of an appointed advisory board. After it is established, a more representative system will be established that will include representatives from relevant scholarly societies.

An application will be submitted that will help implement MuSO through an NEH Implementation Grant. That grant will fund:

- Software development
- Metadata creation
- Database curation
- Publicity and PR for metadata creation, aggregation, and digital peer review

Remaining Questions:

- What is MuSO going to aggregate?
- How do you deal with umbrella projects vs. smaller projects (i.e. SIMSSA vs. its components like Diva.js)?
- Should we aggregate software and how?
- How do we evaluate collaborative work?
- How should we modify <collex:genre>?
- How should we modify <dc:discipline>?
- Should we use Collex? What are our other options?

Appendix D: Official Recommendations to ARC

1. ARC should change its formatting for the role element to something like <Persname role"XXX" xml: id = "Jane Doe"> Are there any other metadata elements that should be treated similarly? (see http://bit.ly/collexwiki)

2. The <collex:genre> element currently includes formats and genres, so it would be best to modify it as below while moving the deleted values over to the <dc:type> element (added values are in bold, deleted values are struck-through):

Analysis, Bibliography, Catalog, ~~Citation~~, Collection, Correspondence, Criticism, Drama, ~~Ephemera~~, **Edition**, Fiction, Historiography, Law, Life Writing, Liturgy, **Musical Work**, ~~Musical Analysis~~, ~~Musical Recording~~, ~~Musical Score~~, Nonfiction, **Performance**, Pretext, Poetry, Religion, Reference Works, Review, Scripture, Sermon, Translation, Travel Writing, Treatise

If this is not possible or acceptable to the ARC community, we would recommend retaining both the deleted and adding the new values.

3. We came up with a set of recommended new values for the <dc:type> element in January. However, given that the current <collex:genre> element includes a number of formats in addition to genres, I have modified our original suggestions so as to make a better distinction between type and genre. You will note that I added "Ephemera" instead of "Realia". Is that acceptable? The following are the suggested values for <dc:type> (additions are in bold):

Citation, Codex, Collection, **Dataset,** Drawing, **Encoded Content, Ephemera,** Illustration, Interactive Resource, Manuscript, Map, Moving Image, **Notated Music,** Periodical, Physical Object, **Printed Text,** Roll, Sheet, Sound, Still Image, Typescript

4. Regarding the <collex:discipline> element, most are happy with the broader term "music" to replace "musicology", especially due to the confusion that could result from using the term musicology (what about music theory, composition, etc.). However, I agree with some that "Art History" should be similarly broadened to "Art" (allowing for art criticism, research, history, etc.). The recommended values for this element would therefore be (modified values are in bold):

Anthropology, Archaeology, Architecture, **Art,** Book History, Classics and Ancient History, Ethnic Studies, Film Studies, Gender Studies, Geography, History, Law, Literature, Manuscript Studies, Math, **Music**, Philosophy, Religious Studies, Science, Theater Studies

5. ARC's current model using <dcterms:hasPart>, <dcterms:ispartof>, and <dc:relation> are sufficient for now, but MuSO will require more complex descriptions of relationships and will be investigating a more FRBR-based model.

6. ARC should include a review date for peer-reviewed content by creating a new non-mandatory element called <collex:reviewdate>

Appendix E: Paper given at the American Musicological Society Southwest spring meeting

AMS Southwest Meeting
April 2, 2016

Music Scholarship Online: Problems for Digital Musicology and a Potential Solution
By Timothy Duguid

When I moved from Scotland to Texas in 2013, I traded-in castles and kilts for American football stadiums and cowboy boots. A historical musicologist whose idea of digital humanities consisted of HTML websites, PDFs, digital music recordings, and Excel spreadsheets, I also found myself in an English department (of all places) trying to navigate a strange new world of metadata schemas and data visualization along with a collection of acronyms and abbreviations that reminded me of Alphabits Soup. My first year was spent configuring a new visualization laboratory dedicated to humanities research, while also trying to catch-up with these new concepts. Throughout my time there, however, my work has revealed several ways in which musicological research is lagging behind other disciplines such as history and literature.

As Laurent Pugin recently observed, most digital work in the field of musicology to date has been focused on issues of access and scale. As we are all aware, more and more resources are being made available online as collections are being digitized. Some examples include the Digital Archive of the Beethoven-Haus, the Digital Image Archive of Medieval Music, and the Julliard Manuscript Collection. In fact, the 2014 AMS Conference in Milwaukee included an entire panel on "Digital Musicology", and it focused almost exclusively on digitized collections and archives.

However, digital musicology and indeed the digital humanities as a whole reach well beyond simply taking a picture of a resource and cataloging it for a web-based interface (valuable as those efforts may be). They also relate to the ability to use, analyze, and manipulate the information contained in that picture. Computers do not natively know how to read what is on an image, so groups such as the Text Creation Partnership have set out to transcribe text-based resources to make them fully computer searchable. Similar efforts in music research would include the KernScores repository and the Josquin Research Project out of Stanford University. Along with the ELVIS project out of McGill University, these projects are focused on creating large collections of computer-readable music for the purposes of analysis.

Since hand transcription is so time intensive, however, corporations such as Google are investing significant capital in Optical Character Recognition technologies. These effectively program computers to be able to "read" what is on images. This is similar in music, which is

even more complicated for computers to "read". Nevertheless, researchers at McGill are attempting to produce a reliable Optical Music Recognition tool that will allow them to quickly transcribe music that can then be searched and analyzed.

Despite these advances, the musicological community has shied away from implementing these along with other recent developments into research and dissemination workflows. Beyond making more music accessible and analyzable as computer-readable data, adaptive user interfaces for displaying and playing music and hold amazing promise for researchers. It is now possible to build and develop diverse, open digital resources to help people better understand and work with music-related data.

There are a number of reasons for the community's reticence towards digital methodologies. Frans Wiering recently published the results of a survey of the ISMIR community that revealed that the lack of usable data was the most significant barrier to scholarship in digital musicology. Second to that were issues of usability and training. Since this survey was conducted among so-called "techies", it is no wonder that they were most concerned with data availability. If I was to poll this room or music departments across the American Southwest, however, I would anticipate that the most significant hurdle would be unfamiliarity or discomfort with digital resources and computer programming. Indeed, there is presently a sharp learning curve for conducting digital research in musicology, and when we add to that the many demands that are made upon the schedules of early career faculty and researchers (the folks who are most likely to want to conduct that research), it is no wonder that digital musicology and its research methodologies remain relatively unexplored and underutilized.

Beyond issues of time constraints, the most significant barriers to born-digital projects in musicology center around the concepts of authority and discoverability. Information posted on the Internet, particularly outside of traditional reputable journals and publishers, carries the stigma of being academically suspect. Given the amount of time and labor required in generating digital resources, few are willing and able to invest a significant amount of time into something that will not advance their career. This then carries over into the music classroom, leaving students to assume that the latest technology in musicology research is limited to PDFs PowerPoints, and streaming audio.

Discoverability also remains a significant issue for all digital projects. Indeed, the challenge for anyone posting information on the internet – regardless of whether that information is open or proprietary, music-related or otherwise – is ensuring that the people who need it most are aware of its existence. Whether we like it or not, Google stands at the forefront of web crawling practices to help with the discoverability problem. Even so, the bias of Google's search results, placing the most well-connected websites and the most popular websites at the top of its results pages, is well documented. The question for researchers on limited or nonexistent budgets is therefore how to ensure that their content can be discovered and disseminated.

While most researchers in the sciences and humanities therefore still turn to fixed formats for reporting their findings and for sharing their data, some are generating born-digital

resources for dissemination. For instance, Jerome McGann's Rosetti Archive combines analysis of art, design, and literature into a single digital resource that includes digital editions of Rosetti's writings and scholarly analysis of all of the site's content.

It is with these types of projects in mind that McGann began the Networked Infrastructure for Nineteenth-Century Electronic Scholarship (NINES). He argued that there would be a brain-drain from digital studies if pre-tenure researchers could not get proper academic credit and wide recognition for their digital work. This virtual research environment (VRE) aggregates digital projects alongside content from archives and scholarly journals, providing a one-stop-shop for nineteenth-century studies. Since the development of NINES, other communities have come online using it as a model: the Medieval Electronic Scholarly Alliance (MESA), the Renaissance Knowledge Network (ReKN), 18th Connect, and Modernist Networks (ModNets). All of these resources form nodes in the Advanced Research Consortium (ARC), providing coverage of humanistic research in each of the major historical epochs of Western Culture. ARC has also begun to add subject-specific mini-nodes that are based on libraries' special collections. These include Studies in Radicalism Online (SiRO) out of Michigan State University and the Great Lakes Aggregator out of the University of Michigan.

ARC stands as an answer to those who are concerned with both discoverability and career advancement in the digital humanities. Scholarly projects request peer review by the illustrious editorial boards that serve each period-specific scholarly community. For projects that pass this peer review, ARC then collects descriptive metadata about them so that they can be aggregated with other high quality resources in a faceted search interface. This is admittedly similar to the cataloging work already being done by libraries, with a significant difference. ARC is a grassroots organization built by scholars for scholars. It relies on its contributors (the experts) to describe their own projects.

ARC does not store anything other than descriptive metadata. Therefore, its user interfaces respond to search queries by presenting the relevant returns from each of its period-specific nodes and then they send users out to the actual resources themselves. This gives each project an amazing amount of flexibility to determine how much information it wants ARC to index, and this allows each project to determine the best methods for presenting its data and/or analyses.

ARC has been eminently successful in reviewing and aggregating digital projects in the fields of history and philology, as its database now lists nearly 100,000 peer-reviewed digital objects among over 1.7 million other cultural artifacts that can all be freely and openly searched through any one of ARC's participating nodes.

This is great for researchers in literature and history, but what about music scholars? Indeed, a number of high-quality digital projects in music have begun to surface, and *Beethoven's Werkstatt* is just one of those projects. This project is creating born-digital genetic editions of Beethoven's music. How can scholars generating born-digital music scholarship such as this ensure that their hard work will be discoverable? Furthermore, how can users ensure that the information presented there is reliable?

Enter: Music Scholarship Online (MuSO). This NEH-funded project seeks to establish a virtual research environment dedicated to music studies that would join the ARC community and would therefore benefit from the interdisciplinary resources already contained therein. In its initial phase, MuSO is working with music scholars, librarians, and coders to modify ARC's current metadata requirements, which are currently tailored to literary and historical scholarship.

We hosted a workshop at Texas A&M at the end of January to begin the revision process, and we came to some interesting conclusions. First, the descriptive metadata required by MuSO must be lean and simple. We are working with digital projects that have limited budgets. If these projects have given any thought to using metadata to describe their site and content, they probably cannot employ a metadata librarian to generate that metadata. Moreover, we are not interested in generating preservation metadata. We are rather interested in gathering metadata necessary for discovery. So, while we rely on the cataloging expertise of librarians, we must continually remind them and ourselves that we are only need the information that will allow scholars to find the digital resources.

Second, we realized that music projects need a more robust system for describing the relationships between objects than what exists for literary and historical scholarship. Perhaps more than any other discipline, music relies on hierarchies and sequences of smaller units to generate perspective and meaning. In the most basic sense, ARC presently allows literary scholars to identify that the "Return of the King" is part of Tolkien's *Lord of the Rings*, so also music scholars can identify the fourth movement of Brahms's *Symphony No. 4*. More than that, however, musicians need to be able to express and distinguish more complex relationships including (but not limited to) excerpts, arrangements, and medleys that are far less prevalent in literary objects.

Finally, we need a more standardized vocabulary for describing objects. ARC relies on authorities such as DublinCore and the Library of Congress for its vocabulary, but even so literary scholars have their own ideas of what constitute discipline, genre, and even the <dc:type> element from DublinCore. These do not necessarily align with how musicians understand these elements, nor do the existing vocabularies meet the needs of music projects. Once again, we are reliant on the community of music scholars and librarians in helping us to develop an ontology that provides meaningful descriptions to music scholars and that plays well across disciplines.

Having dealt with the discoverability issue, I return to the issue of authority. MuSO's position as an aggregator of digital music scholarship can only be cemented among academic circles if it can develop a system of peer review that can ensure the quality of its contributions. Following the examples of ARC's other communities, MuSO will develop a system of peer review. MuSO will gather an editorial board consisting of well-respected music scholars. This group will oversee two levels of peer review. In the first level, the board itself will evaluate projects and archives for inclusion in MuSO. At this level, the board will evaluate projects based on the following four questions:

1. To whom is this content interesting?

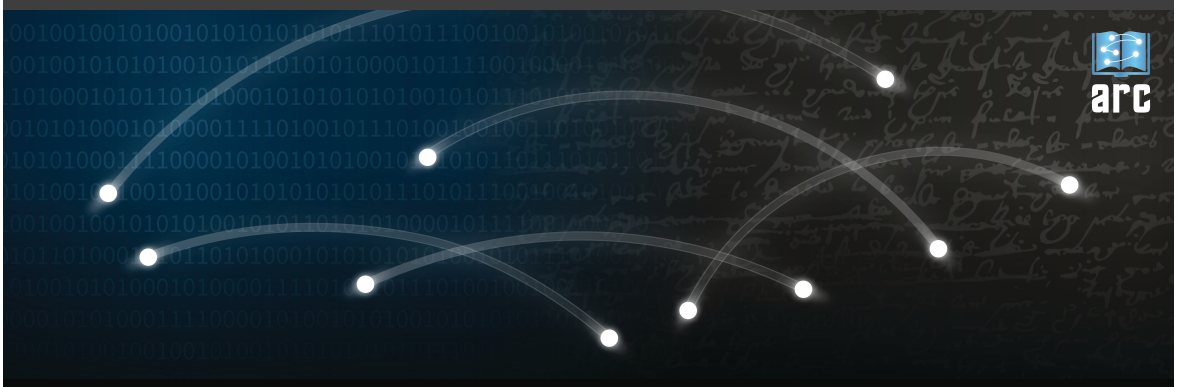
2. How are this project's materials manifested, exposed, and documented?
3. What is the sustainability plan for the project?
4. Does the project achieve its stated goals?

Should a project desire a more rigorous academic review, it can apply to the editorial board for the level two review. In these instances, the editorial board would turn to two groups of experts in relevant fields to examine the resource's content and presentation of data.

With these set, MuSO will be poised to be a leading resource for music researchers to conduct high-quality scholarship, both digital and analog. It will allow scholars to discover content from archives, journals, and digital projects; furthermore, it will promote new digital scholarship. Beyond musical studies, however, scholars will be presented with multidisciplinary relationships and therefore avenues for new and innovative enquiries.

Appendix F: Poster given at the Music Encoding Conference

Aggregation and Peer Review for Music



So, you have a digital project....

How can you ensure that people can discover the content of your project?

How can you make your project interoperable with other projects and digital resources?

How you can receive professional credit for your project?

Music Scholarship Online (MuSO) is a proposed finding aid and peer review platform for digital scholarship in music. It will gather a community of music scholars dedicated to high-quality digital scholarship that will work together to promote the work of their colleagues by conducting outreach to the music community and by building a research environment for students and researchers to harness the power of technology to conduct and disseminate new and innovative research in music.

Metadata

Dublin Core

Custom <collex> elements

Consultation & Standards Meetings

Custom MuSO elements

Data Aggregation

ARC </> RDF

Solr Index

ARC Catalog

ar-c.catalog.org

Peer Review for digital projects

Archives submit for peer review

MuSO

P&T Letter Metadata Ingestion

MuSO has joined the Advanced Research Consortium, which is a hub of humanities research nodes containing scholarly resources spanning the history of Western culture from the medieval to the modern periods. This strategic partnership will promote high-quality multidisicplinary digital research.

National Endowment for the Humanities Fifty Years

Join the MuSO community!
muso.tamu.edu

Texas A&M University

Appendix G: Letter of commitment to host the MuSO website